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STUDIES IN THE USE OF COLOR.

BY- HINDS, LILLIAN R.

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STUDIES RELATED TO WORDS IN COLOR, THE MORPHOLOGICO-ALGEBRAIC APPROACH TO TEACHING READING, ARE DISCUSSED. ADULT CLASSES IN MILWAUKEE TAUGHT TO READ BY THIS METHOD ACHIEVED A MEAN GAIN OF .93 OF A YEAR IN 30 HOURS OF INSTRUCTION. IN EUCLID, OHIO, KINDERGARTENERS WHOSE PROGRESS WAS FOLLOWED THROUGH THE SECOND GRADE WERE TAUGHT BY WORDS IN COLOR AND MAINTAINED AN INITIAL READING GAIN. A STUDY IN CLEVELAND, OHIO, USING THE TRADITIONAL METHOD WITH A CONTROL GROUP AND THE WORDS IN COLOR METHOD WITH AN EXPERIMENTAL GROUP INDICATED SIGNIFICANT GAINS IN THE EXPERIMENTAL GROUP. TEACHERS OF WORDS IN COLOR USE THE FOLLOWING PROCEDURES--(1) GIVING STUDENTS THE RESPONSIBILITY FOR EVALUATING THEIR OWN AND PEER PERFORMANCE, (2) WORKING WITH THE ERRING STUDENT AND, THROUGH INDUCTIVE QUESTIONING, LEADING HIM TO SEE RELATIONSHIPS, (3) USING AN ACTIVITY APPROACH, (4) PLACING EMPHASIS ON DIALECTS AND ON MANY DIFFERENT WAYS OF PRONOUNCING WORDS, AND (5) CONCENTRATING ON THE CODE OF THE LANGUAGE AND ON ITS RELATIONSHIP TO SOUNDS THE SPEAKERS MAKE. THIS PAPER WAS PRESENTED AT THE INTERNATIONAL READING ASSOCIATION CONFERENCE (SEATTLE, MAY 4-6, 1967). (BK)

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"STUDIES IN THE USE OF COLOR" *

by

Lillian R. Hinds,
Supervisor
Elementary Language Arts
Euclid Public Schools
651 E. 222nd Street
Euclid, Ohio 44123

"Words In Color" the commercial name for The Morphologico-Algebraic Approach To Teaching Reading, developed by Caleb Gattegno not only "organizes the sounds of the English language into columns by sound and color", but also "Makes possible awareness and acceptance of cultural and regional pronunciation." (1) For in the process of visual dictation (i.e. the insertion of timing inherent in the ordered pointing to the letter signs) the appropriate color sign is used permitting the desired dialect while adhering to the correct spelling.

The students write from oral dictation or visual dictation. The temporal order of speech, put in motion through visual dictation, facilitates the student's journey from the 3-D world in which he lives to the 2 dimensional book print he must read. The visual dictation also accentuates the importance of order in the formation of words from signs or letters. Sequential programming from the simple to the complex is observed in the Words In Color material.

They speak as a result of observing the pointer or they utilize the pointer for other student's responses. Awareness of language structure and syntax results from the color coding of the function words. This is a process separate and different from the color coding of the charts.

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The format and color of the charts operate to simplify decoding by separating the figure from the ground, the teaching-learning situation from the classroom environment, while the stimulation of the color rivets attention and induces attending. The synthetic and the analytic are both presented with motor-visual equivalence and aduitory training incorporated into a harmoniously knit heuristic garment.

Further, Words In Color within the framework of its organization and materials operates within a well developed, well organized body of learning theory which gives this approach its unusual strength and power. Learning, a function of the learner, is developed inductively. The teacher is a catalytic agent who subordinates teaching to learning by allowing the student to make his own connections through his responses to carefully developed questions. The student is responsible for making value judgements on his own and his classmates' responses and for the correction of his own errors. The teacher then is a relatively silent guide who encourages active participation by her students. The students engage in the algebraic games of permutation and of transformation, ie. the generation of new words through the processes of substitution, addition, insertion, and reversal.

Some Words In Color Reports

The only recorded Words In Color statistical evidence made prior to June 1966 is that of the Milwaukee, Wisconsin, County Department of Public Welfare. (2) They conducted eight Words In Color classes in the welfare center in Milwaukee. These adult classes were taught in two-week periods beginning August 1, 1964 and ending March 5, 1965. The 30-hour classes were taught by PTA volunteers with no previous teaching experience. Some instructors had earned only high school diplomas. The ages of the 119 students ranged from 19 to 60. All of the students were recipients of county welfare. Some had been on welfare roles for only one month. One had been on welfare sustenance for twelve years. The IQ's of the students ranged from 53 to 104. Most of the students had come from southern states.

After 30 hours of instruction the mean gain on California Reading Test scores was .93 years, representing classroom mean gains ranging from .54 to 1.66. Reports did not include tests of statistical significance, but rule of thumb (3) is that one can expect only as much gain as is represented by the time spent in the classroom, so that, based on the equivalent of six days, one could have expected only .0326% of a school year's gain. However, the experimental classes achieved a mean gain of .93 of a school year. (4)

Dr. William G. Dodds, Jr., principal of Indian Hills Elementary School in Euclid, Ohio, as part of the requirements for his Doctor of Education degree from Western Reserve University, wrote as his dissertation in September 1966 "A Longitudinal Study of Two Beginning Reading Programs: Words In Color and Traditional Basal Reader".

In his study, he followed the progress of two kindergarten classes through the second grade. One class used Words In Color beginning in the second semester of kindergarten, and the other class was given traditional reading readiness in the kindergarten, and in the first grade learned to read via the Ginn Basic Reading Series.

At the end of the first grade and at the end of the second grade the 38 children, 19 from each class, were given California Achievement tests. As a result of analyzing results from the lower primary tests at the end of the first grade, he found the results of the Words In Color group to be statistically different in reading vocabulary (P = .002) and in spelling (P = .0001). At the first grade terminal year Words In Color children had a higher range in vocabulary scores than the traditionally taught children. The Words In Color range was 2.1 - 3.6 and traditionally taught children's range was 1.5 - 2.6. This same result was very true in arithmetic reasoning. But the mean difference here was not statistically significant. At the end of grade two the results again favored the Words In Color students in reading vocabulary P=.004 and in spelling P=.002. At this time once again mean comprehension scores favored the Words In Color children, but once again the results were not statistically significant. In arithmetic fundamental the results were statistically significant in favor of the Words In Color children at the .005 level. Testing at the end of the second grade showed the strong lead of the Words In Color children to still hold in word recognition. Tests will also be given this spring at the end of the third grade.

Throughout the United States in varying quantities teachers are trying out the Morphologico-Algebraic Approach to Teaching Reading. There are, however, as yet no published analysis or research other than those to which I have already referred except for my own doctoral dissertation which I shall soon discuss in greater detail.

Marjorie MacDonald, Reading Supervisor of the Boardman schools, near Youngstown, Ohio, has written to me about her experiences with Words In Color during the three years they have tried it. She says that at the end of the first year, "more children moved out of the low group that year than any year previous to the use of Words In Color." She further states, "The first year we had Words In Color (three years ago) we tried it with our lowest groups in first grade. At the end of the year our psychologist did a study that showed that the majority of these lower groups were ready for second grade work. A few had not succeeded, but we had more people move out of the low group that year than any other year. There are very few words that these children, at this time of year, cannot figure out or make a very good attempt at it. They are not confined by any set vocabulary. Many of these children can pick up third grade readers, newspapers, etc., and read them. In every spare moment that these children have they are reading library books. They can choose from quite a variety as very few words will stump them. We find that even those at the bottom of the class have picked up enough to function."

Margaret Marks, first grade teacher, at the Stadium Drive, Boardman local school writes: "Tests for such basic systems as Ginn and Scott, Foresman resulted in much higher scores en masse after experience in Words In Color. Superior scores seemed to be achieved with comparative ease. Low average scores were less frequent. Results in such tests as California Achievement placed most children above grade level -- some three grades beyond normal level, - few, if any, below grade level."

She continues, "The philosophy behind Words In Color is its most outstanding attribute - 'teacher subordination with pupil domination', I found this same philosophy permeating my teaching methods in other subjects with most satisfying results."

"Words In Color is very satisfying in areas of independence giving fast learners more power than any phonetic program I have previously used, and offering the slow learners the support and mastery necessary to apply sounds in independent word attack as well as reading for meaning. It encourages much individualized reading because of confidence and mastery gained through Color (supported by reports from amazed and pleased parents.) Children select and read with ease books beyond their grade level."

"Children at the bottom of the class learn slowly and progress slowly in color just as they have done or would do in any basic series. Color, however, gives them the ability to attack words independently and read for meaning much earlier and more effectively than any method I have previously used. New word presentation just disappears from procedures in reading lessons."

"I am now working in my third year, having worked with the immature, the slow-learning and the accelerated children."

Margaret Bast, Elementary Supervisor of the Stark County Department of Education, writes: "Last spring, several of our local school districts incorporated Words In Color in their summer remedial programs."

"Generally, the results of the six and eight week programs were very good. The junior and senior students gained the most. Also, their attitude toward school work was improved. Follow-up studies being conducted indicate that a high percentage of the students are continuing in their school work with a degree of success that would not have been possible without Words in Color."

"A few teachers feel that is boring for them. One remarked that he could not understand how his high school students could have sustained interest in the program. He readily admitted that they were actually reading and writing perhaps for the first time. He will use the program again because it works."

Harriett Bentley, Reading Coordinator for the Rocky River, Ohio schools reported to the N. C. T. E. in 1965 on the schools responding to a questionnaire she had sent out in reference to their experiences with Words In Color. These schools reported back on a very enthusiastic note.

The Rocky River schools are now completing a three year pilot comparative study of classes using I. T. A., Words In Color, and basal reading programs. Their report is not yet publically available. But at the end of the second year, Words In Color students were outstanding in word attack skills and spelling. These results were statistically significant. These children have in their first, second and third years gone directly into literature, social studies and science programs.

Hardin County's Department of Education's Elementary Coordinator, Roma Wickenden reports that their research on the results of the Words In Color approach to teaching reading will be completed during the summer of 1967.

A member of doctoral dissertations are now in progress. These include one on the Junior High level in the Euclid Public Schools and one on the elementary level in Rocky River, Ohio. Willoughby-Eastlake, Ohio schools are comparing ten Words In Color classes with ten traditional classes, and Cleveland Heights, Ohio will begin a pilot study of two Words In Color classes and two ITA classes.

"An Evaluation of Words In Color or Morphologico-Algebraic Approach To Teaching Reading To Functionally Illiterate Adults"

This investigation was designed to measure the progress of adult illiterates who received thirty hours of instruction in reading. The contrast group was composed of five adult education classes selected by the Cleveland Board of Education and taught by traditional methods. The experimental group consisted of five classes sponsored by PACE (A Plan for Action by Citizens in Education), taught by the Words In Color approach. Tests were administered at the beginning and conclusion of the instructional period.

Summary and Implications

Seventy Cleveland, Ohio inner city adult illiterates, 37 from the contrast group and 33 from the experimental group, were studied to determine the efficiency and effectiveness of Words In Color, or the Morphologico-Algebraic approach to teaching reading.

Two study approaches have been presented in the evaluation of Words In Color. The first included an analysis which tested the basic hypothesis in null form: there is no significant difference between the reading achievement gain of functionally illiterate adults taught by Words In Color or the Morphologico-Algebraic approach to teaching reading and those taught by a traditional reading method. In the event of the rejection of the null hypothesis, two alternatives were considered: (1) Those taught by the Words In Color approach are significantly superior. (2) Those taught by a traditional approach are significantly superior. In order to test the null hypothesis pre- and post- California Reading tests were administered and the t test of difference of means was used.

The second approach was a descriptive one. It involved an evaluation of the impact of the method upon the learner through observation of traditional and Words In Color classes. Ways in which students and teachers approached problems in decoding were observed. The application of learning theory and its affect upon learning was an important concern. The descriptive study also evaluated the performance of eighteen students whose California Reading Test grade level pre- and post- difference scores were the highest and the lowest in their groups. The four highest "gainers" and the four lowest "gainers" from the contrast group (i.e. traditionally taught classes) and the five highest "gainers" and the five lowest "gainers" from the experimental group (i.e. Words In Color classes) were interviewed.

Interview data of these eighteen students from the total seventy students of both groups provided information about the social structure of their families, early educational history, present occupational and home status, and their reactions to their recent adult education class experience. In addition to the direct question interviews, the verbal projective "Who Are You" test and the non-verbal "Draw a Person, Tree, House" tests were administered to obtain information about the self concept and emotional adjustment as it affected their test results.

The affect of the traditional and Words In Color reading methods on the auditory discrimination and visual function of the eighteen students was also noted.

Analytic Approach

The vocabulary, comprehension and total California Reading Test raw scores were used to compute pre- and post- score differences. The gains within the experimental group in each case were statistically significant. The losses within the contrast group could have occurred by chance. The t test of statistical significance using the Cochran and Cox adjustment where there was not equal variability showed the mean difference of the experimental group to be significantly higher from that of the contrast group for each of the raw score sections referred to earlier, i.e. vocabulary, comprehension and total.

The vocabulary, comprehension and total California Reading Test grade level scores were used to ompute pre- and post- score differences. Here again the gains of the experimental group were statistically significant within the group in the comprehension section, and again the losses of the contrast group could have accurred by chance except in the comprehension section where the loss was statistically significant. Once more the gain of the experimental group was significantly different from the loss of the contrast group at the .001 level as measured by the Cochran and Cox modified t test. You will note that the gains in vocabulary and total were also statistically significant.

An analysis of the number of students in each group showed that 43.2% of the contrast students made gains on the California Reading Test score total while 56.8% did not. On the other hand, 75.8% of the experimental group made gains while 24.2 did not. The Chi Square test of significance showed the experimental group's gain to be significantly different from the contrast group's at the .01 level.

Based on the t test of statistical significance, modified where necessary by the Cochran and Cox formula, the null hypothesis was rejected. The null hypothesis states that there is no significant difference between reading achievement gain of functionally illiterate adults taught by the Words In Color or Morphologico-Algebraic approach and those taught by a traditional reading method. Hence the alternative hypothesis can be accepted: There is a significant difference in reading achievement scores. Those taught by the Words In Color or Morphologico-Algebraic approach are significantly superior in reading as measured by raw and grade level score differences and by the numbers in each group who showed gain.

The experimental group's gains in reading were significant in spite of having had teachers of less teaching experience and educational training. The experimental group was also disadvantaged in having lower mean IQ scores than the contrast group as measured by the Revised Beta examination. The contrast group's mean IQ score for the seventeen students for whom test scores were available was 84.117. The experimental group's mean IQ score for their 33 students was 73.727. Here again the experimental group was disadvantaged based on these numbers. An examination of the other confounding variables of auditory discrimination, visual function and color weakness shows the two groups to be either comparable, or the disadvantage accrued to the experimental group.

The statistical evaluation indicates that under the conditions of this study the Words In Color approach was superior. These students maintained even, consistent gain. The students taught by a traditional approach had large variability in before and after test results indicating unstable scattered change scores. While most of the consistent loss of the contrast group students could have been due to chance, it might have demonstrated the unsuitability of traditional methods for concentrated brief instructional periods. While the brevity of the instructional period

might have helped to illustrate the suitability of Words In Color as an efficient and effective way to reduce illiteracy within a brief period of time, it would also be valuable to replicate the study over a longer instructional period to see whether or not findings similar to those of this study would reoccur. The results of this study under conditions where the excellent teachers of the contrast group had greater training and experience than the teachers of the experimental group would seem to imply that the cause of the significantly superior results was primarily due to the method and not to the superiority of the teachers.

Under the conditions already discussed where the advantages benefited the students of the traditional reading method and the statistical results showed the superiority of the Words In Color approach, then it would appear to behoove educators to consider replicating this study, to teach Words In Color through other pilot programs of longer duration like those of the Euclid and Rocky River studies to examine the strengths of the Words In Color or Morphologico-Algebraic approach to teaching reading. It should be noted that color weakness was not an inhibiting factor since color weak students did as well or better than those with no color weakness.

Descriptive Evaluation: Classroom Observations

Observations of both traditional and Words In Color classes lead the writer to the following descriptive evaluative summary of Words In Color. The materials of Words In Color provides a learning situation which structures the separation of the figure ground of the instructional materials and the rest of the classroom through the intense stimulation of the chart's color morphology.

Teachers of Words In Color follow five major procedures. They are as follows:

1. They give students the responsibility for evaluating their own and peer performance rather than relying on teacher criticism.
2. They work with the erring student and through inductive questioning lead him to see relationships rather than calling on another student for a correct response, since emphasis is on discovery principles which stress processes leading to response and on many correct answers rather than one correct answer.
3. They use an activity approach which stimulates manipulation and internalization of conscious processes of controlling the formation of new words through addition, substitution, insertion and reversals.
4. They place emphasis on dialects and many different ways of pronouncing words rather than rigid uncompromising standards.
5. They concentrate on the code of the language and its relationship to sounds the speakers make. Observation further showed that inexperienced experimental teachers could utilize the power of the Words In Color methods and materials of inquiry to develop awareness of process for problem solving.

Reference Page

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(2) Milwaukee, Wisconsin, County Department of Public Welfare. Unpublished Report 1965.

(3) Austin, Mary C. Reading in the Elementary Schools, 1950-51, Education 445 class lecture notes, Western Reserve University, Cleveland, Ohio.

(4) Ibid